CPA－(1)に対する補正書(1)／補正書(1)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

12/13

In Re Application Of: Rossin	§	Group Art #: 1754
Serial No.: 08/662,129	§	Examiner: Straub, Gary P.
Filed: 6-12-96	§	
Title: Catalytic Process for the Decomposition of Perfluoroalkanes	§	Docket #: G71431US

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I hereby certify that this correspondence is being deposited with the United State Postal Service as First Class Mail in an envelope with sufficient postage, addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

Debbie Allen

October 8, 1998
Date

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

RESPONSE TO OFFICE ACTION MAILED JUNE 5, 1998

In response to the Examiner's thorough Office Action mailed June 5, 1998, the Applicant respectfully submits the following amendment and remarks and requests favorable action thereon.

IN THE CLAIMS

Please delete claims 1-20. Please add the following claims:

--21. A catalyst composition for the decomposition of perfluoroalkanes to HF and CO_2, said catalyst composition consisting essentially of:

aluminum oxide, and

minority amounts of zirconia and cobalt effective to stabilize the aluminum oxide.

22. The catalyst composition of claim 21 wherein the zirconium oxide is present in an amount of about 3% by weight of the total catalyst composition.

23. The catalyst composition of claim 21 wherein the cobalt is present in an amount of about 5% by weight of the total catalyst composition.

24. The catalyst composition of claim 21 wherein said aluminum oxide is stabilized with effective amounts of zirconia and cobalt such that the catalyst composition is capable of converting greater than about 90% of C_2F_6 for approximately 400 hours wherein about 90 grams of the catalyst composition is exposed to a gas stream containing about 500 ppm C_2F_6, about 3.2 volume percent water, with the balance being air, at a gas hourly space velocity of about 1,800 $hour^{-1}$ at about 700° C.

25. The catalyst composition of claim 21 stabilized with effective amounts of zirconia and cobalt such that the catalyst composition is capable of converting greater than about 90% of C_2F_6 during a about 78 hour run wherein one gram of the catalyst was exposed to a gas stream containing about 1000 ppm C_2F_6, about 3.6 volume percent water, with the balance being air, at a gas hourly space velocity of about 6000 $hour^{-1}$ at 800° C.

26. The catalyst composition of claim 21 wherein the aluminum oxide is gamma phase aluminum oxide.

REMARKS

Claims 1-20 were pending and claims 1-20 were rejected by the Examiner. Specifically, the Examiner rejected claims 1, 2, 7 and 8 as anticipated under 35 U.S.C. § 102(b) or, in the alternative, as obvious under 35 U.S.C. § 103(a) over Bond and Sadeghi. (A copy of the article is submitted herewith with Applicant's Information Disclosure Statement.) The Examiner stated Bond and Sadeghi set forth "the destruction of perhalocarbons by passing them over a catalyst containing high surface alumina as required by the claims." Claim 1 has been cancelled and Applicant has added new claim 21. Claim 21 claims a catalyst for the decomposition of perfluoroalkanes consisting essentially of alumina oxide and stabilizing amounts of zirconia and cobalt. Bond and Sadeghi disclose a catalyst composition of .8% or more platinum and aluminum oxide to treat chlorinated hydrocarbons. The Bond and Sadeghi article is silent as to the use of an aluminum oxide catalyst to treat fluorinated hydrocarbons. And, as noted by Nagata et al., as chlorine atoms are decreased and replaced with fluorine, the compounds become increasingly more difficult to decompose. Bond and Sadeghi do not disclose or suggest using aluminum oxide stabilized with zirconia and cobalt to treat chlorinated hydrocarbons, much less fluorinated compounds as presently claimed. At best, Bond and Sadeghi teach an aluminum oxide/platinum catalyst to treat chlorinated hydrocarbons. Due to the scope of the amended claim, Applicant respectfully submits that claim 21, and its dependents, are patentable over Bond and Sadeghi.

The Examiner also rejected original claim 1, now cancelled, over the Nagata et al. reference. Specifically, the Examiner stated claims 1, 2, 5 and 7 were anticipated under

35 U.S.C. § 102(b) and obvious under 35 U.S.C. § 103 over Nagata et al. Claims 1, 2, 5, and 7 have been cancelled and new claims 21-26 have been submitted. Claim 21 is directed to a specific embodiment of the invention consisting essentially of aluminum oxide, stabilized with zirconia and cobalt. Nagata et al. discloses the catalytic oxidative decomposition of chlorofluorocarbons in the presence of hydrocarbons over an aluminum catalyst above or supporting Sn, Mn, Ni, Rn, Rh, Pd, Pt, Fe, Cu, Au, Cr, Co, Zn, Mo, Ce, V, or W to convert CFC 115 (CF_3CF_2Cl) in the presence of n-butane. Besides not teaching the decomposition of perfluoroalkanes, Nagata et al., at best, teaches to utilize an alumina supported cobalt catalyst to convert CFC's. Nagata et al. does not teach or even suggest using zirconium supported on a gamma phase alumina catalyst, and certainly does not teach utilizing stabilizing amounts of zirconia and cobalt to stabilize the gamma alumina catalyst to convert perfluoroalkanes. Consequently, the Applicant respectfully submits new claim 21, and claims dependent thereon, are patentable over Nagata et al.

The Examiner rejected claims 1-3, 6-8 as anticipated by, or in the alternative, as obvious over Okazaki et al., U.S. Patent No. 5,151,263. Claims 1-3, and 6-8 have been cancelled and Applicant has submitted new claims 21-26 directed to a catalyst composition consisting essentially of aluminum oxide, zirconium, and cobalt. Okazaki et al. discloses the use of alumina or alumina/silica complexed oxide catalysts to decompose chlorofluorocarbons. In addition, Okazaki et al. specifically teaches:

> On the other hand, such fluorocarbon containing no chlorines as tetrafluoromethane (flon-14) can not almost [sic] decomposed by the method of this invention . . .

And,

> On the other hand, flon-14 of fluorocarbon, which contains no chlorine and has less fear of destructing the ozone layer is **scarcely decomposed.**

(emphasis added)

Thus, Okazaki et al. teach that an alumina catalyst cannot decompose fluorocarbons. Thus, Okazaki et al. teach away from the present invention. The present invention teaches alumina catalysts can convert fluorocarbons like perfluoroalkanes and, according to a preferred embodiment, teaches an alumina, zirconia, cobalt catalyst is particularly effective for converting fluorocarbons. Okazaki et al. do not teach or suggest using zirconia, or cobalt, or both in amounts effective to stabilize an aluminum oxide catalyst to convert perfluoroalkanes. The Applicant respectfully submits new claims 21-26 are allowable over Okazaki et al. and requests favorable action thereon.

The Examiner also rejected claims 1-20 as anticipated by (102(b)) and as obvious (103(a)) over Green et al., U.S. Patent No. 5,276,249. Green et al. discloses a zeolite (a natural hydrated silicate of aluminum and either sodium, calcium, or both of the type $Na_2O \cdot Al_2O_3 \cdot SiO_2 \cdot yH_2O$) impregnated with Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Mo, Pd, and Pt for the destruction of halogenated organics. New claim 21 claims an aluminum oxide catalyst stabilized with effective amounts of zirconium and cobalt. Green et al. does not disclose or teach the use of an aluminum oxide catalyst but teaches the use of a metal exchanged, metal impregnated aluminosilicate zeolite catalyst. Green et al. does not teach or suggest the use of zirconium to stabilize an aluminum oxide catalyst. Green et al. does not teach or suggest the use of a combination of zirconium and cobalt to stabilize an aluminum oxide catalyst for treating perfluoroalkanes. In fact, Green et al. does not

even mention zirconium. Finally, it should be reemphasized that Green et al. teaches a metal-exchanged, metal impregnated aluminosilicate zeolite catalyst. Green et al. does not teach or suggest the present invention. Indeed, Green et al. identify aluminum oxide as only a possible support for the metal exchanged, metal impregnated aluminosilicate zeolite catalyst. (See, for example, claim 5.) The present invention, as now claimed, according to one embodiment, is directed to an aluminum oxide catalyst stabilized with effective amounts of zirconium and cobalt for converting perfluoroalkanes. The Applicant believes new claims 21-26 are patentable over Green et al. and requests favorable action thereon.

CONCLUSION

Based upon the foregoing, the Applicant respectfully submits new claims 21-26 are patentable over the art and Applicant respectfully requests favorable action thereon.

Respectfully submitted,

Date: 10/8/98

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